

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A machine adapted to assemble a dental product, the dental product having a body, first and second gears, and a tool, the machine comprising:
feeders for automatically supplying the component parts;
contiguous assembly stations coupled to the feeders for receiving the component parts and for performing assembly steps of the dental product, the assembly stations comprising a body station for receiving and holding the body of the product, at least two gear stations for introducing the first and second gears of the dental product into the body, and a tool station for connecting the tool to the second gear of the dental product, wherein the machine produces assembled dental products angles.
2. (original) The machine of Claim 1 further comprising a lubricating station for applying lubricant to the gears of the dental product.
3. (currently amended) The machine of Claim 1 further comprising a first conveyor for automatically moving assembled dental products angles to a bagging unit, the bagging unit automatically bagging the assembled dental products angles.

4. (original) The machine of Claim 3 further comprising a batch-counting unit for automatically counting a batch of assembled and bagged dental products and placing the batch in a container, and a second conveyor for moving assembled and bagged dental products from the bagging unit to the batch-counting unit.

5. (original) The machine of Claim 4 further comprising a batch conveyor system comprising a first accumulating conveyor for supplying containers to the batch-counting unit and a second accumulating conveyor for moving a container with the batch to an unloading station.

6. (original) The machine of Claim 5 further comprising a carton-sealing unit for sealing the container, the carton-sealing unit being located on the second accumulating conveyor and prior to the unloading station.

7. (original) A machine for automating the assembly of a dental product, the dental product comprising a body, first and second gears, and a tool, the machine comprising:

a moveable table having a plurality of fixtures for holding the dental product during assembly;

a body feeder for supplying the body of the dental product;

a body transfer mechanism for moving the body from the body feeder to the fixtures;

a first gear feeder for supplying the first gear of the dental product;

a first gear transfer mechanism for moving the first gear from the first gear feeder and locating it in the body of the dental product;

a second gear feeder for supplying the second gear of the dental product;

a second gear transfer mechanism for moving the second gear from the second gear feeder and locating it in the body of the dental product;

a tool feeder for supplying the tool of the dental product;

a tool transfer mechanism for moving the tool and attaching it to the dental product; and

an assembled dental product transfer mechanism for transferring an assembled dental product from the moveable table.

8. (currently amended) The machine of Claim 7 further comprising a lubricator for lubricating the first and second gears of the dental product [[angle]].

9. (currently amended) The machine of Claim 7 further comprising sensors for detecting the presence of the body, the first and second gears, and the tool to ensure that the dental product [[angle]] has been properly assembled.

10. (currently amended) The machine of Claim 9 further comprising an assembled product diverter for separating assembled dental products angles having the body, first and second gears, and the tool from those assembled dental products angles that are missing either the body, first and second gears, or the tool.

11. (currently amended) The machine of Claim 7 further comprising a first conveyor for automatically moving assembled dental products [[angles]] to a bagging unit, the bagging unit automatically bagging the assembled dental products [[angles]].

12. (original) The machine of Claim 11 further comprising a batch-counting unit for automatically counting a batch of assembled and bagged dental products and placing the batch in a container, and a second conveyor for moving assembled and bagged dental products from the bagging unit to the batch-counting unit.

13. (original) The machine of Claim 12 further comprising a batch conveyor system comprising a first accumulating conveyor for supplying containers to the batch-counting unit and a second accumulating conveyor for moving a container with the batch to an unloading station.

14. (original) The machine of Claim 13 further comprising a carton-sealing unit for sealing the container, the carton-sealing unit being located on the second accumulating conveyor and prior to the unloading station.

15. (currently amended) A machine for automating the assembly of a dental prophylaxis angle, the angle comprising a body, two gears, and a prophy cup, the machine comprising:
feeders for the body, the two gears, and the prophy cup;

transfer mechanisms for moving the body, the two gears, and the prophylaxis cup from the feeders to an assembly table and for assembling the body, the two gears, and the prophylaxis cup into an assembled dental prophylaxis angle;

sensors for distinguishing correctly assembled angles from incorrectly assembled angles;

an assembled angle diverter for diverting incorrectly assembled angles to a reject location and for diverting correctly assembled angles to a first conveyor;

a bagging unit for receiving correctly assembled angles from the first conveyor and automatically bagging the correctly assembled angles;

a second conveyor for moving the bagged angles from the bagging unit;

a batch-counting unit for receiving the bagged angles and counting a batch, the batch comprising a predetermined number of angles, and for placing the batch into one of a plurality of containers to form a filled container;

a first accumulating conveyor for supplying the plurality of containers to the batch-counting unit;

a second accumulating conveyor for moving the filled container from the batch-counting unit; and

a container sealer for sealing the filled container.

16. (currently amended) In a method of assembling a dental device with automated machinery, the dental device having a body and at least two gears, the body having a first end adapted to receive a drive mechanism for turning the gears of the dental device and a second end for holding a dental tool, the second end having a

closure for closing off the second end of the dental product, a method for automatically closing the body of the dental device after the gears have been introduced into the body, the method comprising:

receiving the body of the dental device [[angle]] with gears loaded into the body, the body being located on a mounting post that engages the first end of the dental device to hold it; and

closing the body of the dental device by using a mechanism that snaps the closure to a closed position to close off the second end of the body [[angle]].

17. (currently amended) The method of claim 16 wherein the step of closing the body of the dental device further comprises engaging an outer surface of the closure and rotating it to the closed position.

18. (currently amended) A method of assembling a dental device product, the dental device product having a body, first and second gears, and a tool, the method comprising:

transferring the body of the dental device from a body feeder to a moveable table;

advancing the table to move the body to a first gear loading station and loading the first gear into the body;

advancing the table to move the body to a second gear loading station and loading the second gear into the body;

advancing the table to move the body to a closure station and closing the body of the dental device;

advancing the table to move the body to a tool loading station and connecting the tool to the second gear of the dental device. [[;]]

19. (currently amended) The method of claim 18 further comprising advancing the table to move the body to an inspection station, and inspecting the dental device [[angle]] to determine whether it has been assembled properly.

20. (currently amended) The method of claim 19 further comprising diverting dental devices that have not been assembled properly to a rejection container and diverting dental devices that have been assembled properly to a conveyor to convey the properly assembled dental devices angles to a bagging station and conveying the properly assembled dental devices angles on a conveyer to the bagging station and bagging the properly assembled dental devices angles.

21. (original) The method of claim 18 further comprising lubricating the first and second gears of the dental device.

22. (original) The method of claim 20 further comprising conveying the bagged dental devices to a batch-counting device, counting the bagged dental devices using the batch-counting device and creating a batch of dental devices comprising a selected number of dental devices.

23. (original) The method of claim 22 further comprising loading the batch into a container and conveying the container to an unloading station.

24. (original) The method of claim 23 further comprising sealing the container prior to conveying the container to the unloading station and then conveying the sealed container to the unloading station.

25. (currently amended) In a machine for assembling a dental prophylaxis angle, the dental angle comprising a body, having a first end adapted to receive a doriot hand piece drive mechanism and a second end having a closure member for closing the second end of the angle, and at least two gears, a plurality of identical fixtures for assembling the dental angle device, the fixtures comprising:

a base for mounting the fixture to a moveable table; and
a post mounted to the base for holding the body of the dental angle device, the post being sized to correspond to the doriot hand piece drive mechanism.

26. (original) The fixtures of claim 25 wherein the post extends vertically upward from the base to hold the body in a vertically upward position.

27. (original) The fixtures of claim 25 further comprising a closer device for engaging the closure member of the second end of the angle and moving it to a closed position in which the dental angle is closed.

28. (original) The fixtures of claim 27 wherein the closer mechanism is sized to engage the closure member of the body and is coupled to an actuator linkage that is moveable between open and closed positions such that when the actuator linkage is activated it moves the closer mechanism to engage the closure member and moves the closure member to a closed position.

29. (original) In a machine for assembling a dental device, the dental device comprising a body and first and second gears, the machine comprising:

- a movable table;
- a plurality of fixtures located on the movable table for holding the body of the dental device during phases of assembly;
- a plurality of stations that perform steps of assembly of the dental device in sequence with the movable table;
- a body feeder for supplying the body to a body isolator, the body isolator isolating a single body from the body feeder, and a body pick-and-place unit for moving the isolated body from the body isolator to one of the fixtures;
- a first gear feeder for supplying the first gear to a first gear isolator, the first gear isolator isolating a single first gear from the first gear feeder, and a first gear pick-and-place unit for moving the isolated first gear from the first gear isolator to one of the fixtures on which a body is located; and
- a second gear feeder for supplying the second gear to a second gear isolator, the second gear isolator isolating a single second gear from the second gear feeder,

and a second gear pick-and-place unit for moving the isolated second gear from the second gear isolator to one of the fixtures on which a body and first gear are located.

30. (original) The machine of claim 29 wherein the dental device also comprises a tool and the machine further comprising a tool feeder for supplying the tool to a tool isolator, the tool isolator isolating a single tool from the tool feeder, and a tool pick-and-place unit for moving the isolated tool from the tool isolator and placing it on the second gear.

31. (new) A system for making dental prophylaxis angles, the system comprising a plurality of mounting posts, each adapted to support components of a dental prophylaxis angle as the components are being assembled into a dental prophylaxis angle, a movable table for carrying the mounting posts through a plurality of stations at which different assembly steps are performed;

a body station which takes an oriented body and places it on the mounting post at the body station;

a first gear member station which takes an oriented first gear member and places it in the body on the mounting post at the first gear member station;

a second gear member station which takes an oriented second gear member and places it in the body on the mounting post at the second gear member station; and

a tool station which attaches a tool to the second gear member in the body on the mounting post at the tool station.

32. (new) The system according to claim 31 further comprising a closing station for closing a hinged closure on the body to enclose the first and second gear members in the body on the mounting post at the closing station.

33. (new) The system according to claim 31 further comprising a lubrication station for injecting lubricant into the body adjacent to the first gear member, and a first gear member seating station for seating the first gear member in a bearing in the body on the mounting post at the first gear member seating station.

34. (new) The system according to claim 31 wherein the mounting posts are adapted for engaging the interior of the bodies without regard to the external configuration of the bodies.

35. (new) The system according to claim 34 wherein the mounting posts are adapted for engaging the interior of the bodies without any contact with the exterior of the bodies.

36. (new) The system according to claim 31 wherein each mounting post has a passageway therein positioned to align with a first drive shaft passage in the body, when the body is mounted on the mounting post, and a pin translatable in the passageway to selectively block the seating of a drive shaft in the first drive shaft passage in the body.

37. (new) A system for making dental prophylaxis angles, the system comprising a plurality of mounting posts, each adapted to support the components of a dental prophylaxis angle as the components are being assembled into a dental prophylaxis angle, a table for carrying the mounting posts past a plurality of stations at which different assembly steps are performed;

a body feeder that orients bodies from bodies loaded therein;

a body station which takes an oriented body and places it on the mounting post at the body station;

a first gear member feeder that orients first gear members from first drive gear members loaded therein;

a first gear member station which takes an oriented first gear member and places it in the body on the mounting post at the first gear member station;

a second gear member feeder that orients second gear members from second gear members loaded therein;

a second gear member station which takes an oriented second gear member and places it in the body on the mounting post at the second gear member station;

a tool feeder that orients tools from tools loaded therein;

a tool station which takes an oriented tool and attaches it to the second gear member in the body on the mounting post at the tool station.

38. (new) The system according to claim 37 further comprising a closing station for closing a hinged closure on the body to enclose the first and second gear members in the body on the mounting post at the closing station.

39. (new) The system according to claim 37 further comprising a lubrication station for injecting lubricant into the body adjacent to the first gear member, and a first gear member seating station for seating the first gear member in a bearing in the body on the mounting post at the first gear member seating station.

40. (new) The system according to claim 37 wherein the tool station includes support for engaging the body as the tool is applied to the second gear member.

41. (new) The system according to claim 37 wherein the mounting posts are adapted for engaging the interior of the bodies without regard to the external configuration of the bodies.

42. (new) The system according to claim 41 wherein the mounting posts are adapted for engaging the interior of the bodies without any contact with the exterior of the bodies.

43. (new) The system according to claim 37 wherein each mounting post has a passageway therein positioned to align with a first drive shaft passage in the body, when the body is mounted on the mounting post, and a pin translatable in the passageway to selectively block the seating of a drive shaft in the first drive shaft passage in the body.

44. (new) A system for making dental prophylaxis angles, the system comprising a plurality of mounting posts, each adapted to support a dental prophylaxis angle as it is being assembled, the posts moving in series through a plurality of stations at which a different assembly step is performed, the assembly step at each station being performed on that dental prophylaxis angle at its respective mounting post substantially simultaneously.

45. (new) The system according to claim 44 wherein each mounting post has substantially the configuration of a Doriot nose for engaging the interior of the bodies without regard to their external configuration.

46. (new) The system according to claim 45 wherein the mounting posts are adapted for engaging the interior of the bodies without any contact with the exterior of the bodies.

47. (new) The system according to claim 45 wherein each mounting post has a passageway therein positioned to align with a first drive shaft passage in the body, when the body is mounted on the mounting post, and a pin translatable in the passageway to selectively block the seating of a drive shaft in the first drive shaft passage in the body.

48. (new) A method for making dental prophylaxis angles, the method comprising:

placing a body of a dental prophylaxis angle on a corresponding one of a plurality of mounting posts carried by a table, each said mounting post having substantially the configuration of a Doriot nose for engaging the interior of a body of a dental prophylaxis angle without regard to the external configuration of the body;

advancing the table to move the body on said corresponding post to a first gear member station and placing a first gear member in the body on said corresponding post at the first gear member station;

advancing the table to move the body on said corresponding post to a second gear member station and placing a second gear member in the body on said corresponding post at the second gear member station; and

advancing the table to move the body on said corresponding post to a tool station and attaching a tool to the second gear member in the body on said corresponding post at the tool station.

49. (new) A method for making dental prophylaxis angles, the method comprising:

placing a body of a dental prophylaxis angle on a corresponding one of a plurality of mounting posts carried by a table, each said mounting post having substantially the configuration of a Doriot nose for engaging the interior of a body of a dental prophylaxis angle without regard to the external configuration of the body; and

advancing the table to move the posts in series through a plurality of stations at which a different assembly step is performed, the assembly step at each station being

performed on that dental prophylaxis angle at its respective mounting post substantially simultaneously.

50. The machine of Claim 1 wherein the machine produces assembled dental prophylaxis angles.

51. The machine of Claim 7 wherein the machine produces assembled dental prophylaxis angles.

52. The method of claim 18 wherein the assembled dental product is an assembled dental prophylaxis angle.

53. The machine of claim 29 wherein the machine produces assembled dental prophylaxis angles.